ANNUAL REPORT

WEST VIRGINIA DEPARTMENT OF AGRICULTURE

PLANT PEST CONTROL DIVISION

JULY 1, 1985 - JUNE 30, 1986

The Plant Pest Control Division has the responsibility of carrying out the provisions of certain agricultural laws and enforcing the rules and regulations that have been promulgated from these laws. These include the following: (1) The Plant Pest Act of 1967, as amended 1972, which provides for agricultural plant pest survey and control and forest insect and disease survey and control, including the detection of possible newly introduced, or exotic, pests, biological control programs for insects and plant diseases, general insect and plant disease identification, and nursery inspection and registration; (2) The West Virginia Apiary Law of 1969, as amended 1981, which provides for apiary inspection, bee disease control and information which will promote beekeeping in West Virginia; (3) The West Virginia Noxious Weed Act of 1976, as amended 1981, which provides for surveillance, suppression and control of noxious weeds; (4) The Pesticide Act of 1961, The Pesticide Use and Application Act of 1975 and regulations established in 1982, which provide for certification of pesticide applicators, licensing of businesses applying pesticides for hire and pesticide product registration; (5) The Black Stem Rust Quarantine of 1967, which provides for wheat stem rust disease control through barberry (Berberis spp.) survey and eradication; and (6) The White Pine Blister Rust Quarantine of 1967, which provides for white pine blister rust control through currant and gooseberry (Ribes spp) survey and eradication. In carrying out this legislation, the Division cooperates with Federal, state and local government agencies. Specific, annually renewed, cooperative agreements exist with the U. S. Forest Service (USFS), the U. S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) and the U. S. Environmental Protection Agency (EPA).

The main offices and laboratories of the Division are located at the Guthrie Agricultural Center. Field offices are located in Union, Pipestem, Inwood and Morgantown and a number of field personnel are headquartered out of their homes in various parts of the state. These latter locations include: Berkeley Springs, Keyser, Capon Bridge, Franklin, Shady Spring, Huntington and Ripley.

Personnel wise, 1985-86 was a year that saw an unusual amount of staff shuffling and turnover in the Division. Staff changes occurred in the Division Administration, the Agricultural Plant Pest Survey Program, the Apiary Program, the Forest Pest Action Program, the Pest Identification Laboratory and the Pesticide Use and Application Program.

Division wide, the year was highlighted by: the preparation of a 5-year development plan, as part of a larger Department effort; the implementation of the most intensive agricultural plant pest survey to date; a cooperative agreement with West Virginia University (WVU) to explore the potential of rose rosette disease for biological control of multiflora rose; the approval of a plan to publish a West Virginia honey directory; a cooperative methods development project with the USFS and APHIS utilizing the F-1 inherited sterility technique for gypsy moth suppression; the successful completion of the largest gypsy moth aerial suppression project to date; significant progress in the identification of unidentified specimens in the reference insect collection; regulatory enhancements in the Pesticide Use and Application Act; and the progress made in computerization of the Division.

Division personnel and programs were guided by the Division Work Plan. No major deviations from this plan were experienced, except for not meeting deadlines set for completion of objectives associated with the preparation of a gypsy moth spray project proposal. This was due to the lack of adequate field personnel for the large geographic area, much of which was rugged, that needed coverage. Where other deviations occurred and/or projected goals were not reached, they are explained in individual program reports.

Summaries of major Division accomplishments by program for the 1986 fiscal year are as follows:

Agricultural Plant Pest Survey - Agricultural crops of corn, soybeans, alfalfa, small grains and tobacco were monitored for endemic plant pests and exotic pests not known to occur in West Virginia or the United States. Surveys were conducted in 12 counties covering the different geographic areas of the state. At least 2-3 fields of each crop were surveyed in each county. Black light traps were operated in 6 counties to survey for nocturnal Lepidoptera and Coleoptera of agricultural importance. Fifty traps were placed in 6 counties for detection of exotic insects by pheromone trapping. The data collected from these surveys were coded and electronically transmitted to the USDA-APHIS computer in McClean, Virginia and pertinent data were reported to county agents and other cooperators and the general public.

Noxious Weeds - Agricultural plant pests include noxious weeds. These pests are the responsibility of the

ventures, one with West Virginia University Wildlife Division personnel, one with the USFS, APHIS and Uniroyal and one with the West Virginia Department of Natural Resources' Wildlife Resources Division.

Aerial flights conducted in June 1986, revealed 8,570 acres of defoliated forest land. Of this total, 8,250 acres were caused by gypsy moth and the remaining 320 were of unknown origin.

The principal native insects active during the year included: locust leafminer, yellow poplar weevil, ambrosia beetles, and orangestriped oakworm. Extreme mortality to scarlet oaks in the Elkins area in the 1986 season was traceable to defoliation by oak leaftier in the spring of 1985 followed by dry conditions in 1986.

Hardwood tree diseases receiving attention during the year included: a new disease of black cherry, Cytospora canker (Cytospora leucostroma); a new disease of dogwood trees, dogwood anthracnose (Discula sp.); oak decline, a disease prevalent in the state in the 1950's; bacterial canker of oaks; and oak wilt. The work on black cherry Cytospora canker included a joint survey with the USFS and the states of Pennsylvania and Maryland and the work on bacterial canker of oak was done in cooperation with researchers at West Virginia University.

Coniferous tree diseases of note included: pine root decline (Verticicladiella procera); a new foliage disease (needlecast) of white pine, Meloderma desmazeeri; Rhizosphaera needlecast in blue and Norway spruce; and Naemacylus and Lophodermium needlecasts in Scotch Pine.

A greenhouse study involving the 3 root rot pathogens Phytophthora cinnamomi, P. cactorum and Verticicladiella procera identified P. cinnamomi as the only one of the three to kill conifer seedlings used in the study.

This year, 52,734 acres of land were surveyed for Ribes bushes (the alternate host for white pine blister rust disease) and for diseased pine. Suppression activities took place on 3,035 acres with 7,797 Ribes plants destroyed.

J. B. McLaughlin Agricultural Library - Currently, the library's holdings include 4,200+ books and documents, 659 bound periodical volumes, a large number of unbound periodicals and 225 boxes of pamphlets and technical papers. This year, 558 books and 541 pieces of technical literature were cataloged and indexed and 59 journal volumes were prepared for the bindery.

Nursery Inspection and Registration - There were 156 nurseries and 394 nursery dealers registered to distribute

nursery stock in the state this year. Inspections were conducted at 275 nurseries and nursery dealerships. More than 800 pieces of nursery stock were placed under quarantine due to infestations of insects or plant diseases.

Federal and interstate regulatory work included 9 inspections for plants being moved out-of-state and 2 inspections for oak lumber for export overseas.

One unregistered nurseryman was prosecuted and found guilty of violating the Plant Pest Act.

Pest Identification Laboratory - Phone calls increased 22% above the previous year from 2,849 to 3,476, while submitted specimens were down 18% from 615 to 502. Tabular breakdowns of this year's totals are given in the report proper.

An emphasis on organizing and identifying incompletely identified specimens in the reference insect collection resulted in a significant increase in the number of species and fully identified specimens. New species added totaled 196. This effort was aided by outside specialists in specific insect groups that were recruited at no monetary charge.

The reference insect collection was one of 3 areas in the Division initially targeted for computerization. Several thousand specimen records were entered by the end of the year and when these are completed it will greatly enhance collection management and data utilization.

Pesticide Use and Application Program - During the year, 778 certification examinations were administered to 402 persons. Licenses were processed for 208 businesses to apply pesticides for hire and 148 dealers to sell restricted use pesticides. Certifications were processed for 1,049 commercial and certified public applicators and 339 new private applicators. Certification records were maintained for 10,798 private applicators or farmers certified to purchase and apply restricted use pesticides.

There were 391 inspections performed and 186 samples taken in the course of enforcement related work. Concerning complaint investigations, the majority of these centered around treatments for termites and powder post beetles and the issuance of reports regarding the inspection of homes for wood destroying organisms at the time of sale. Enforcement actions taken as a result of investigations totaled 41.

Administratively, the Pesticide Use and Application Act and its regulations were enhanced by legislative and Departmental action.

Registration activities resulted in 623 pesticide producing companies registering 6,528 products for sale or distribution in the State. In addition to these normal registrations, 7 Experimental Use Permits, 3 FIFRA Section 18 Emergency Exemption requests and 4 FIFRA Section 24C Special Local Needs requests were processed.

Computerization of registrations was completed at the beginning of the fiscal year. This allowed for the preparation of computer generated renewal forms to reregister products for the first time. As a result, the registrations for calendar year 1986 were completed in record time. The registration books printed for field inspectors were all distributed by April 1, rather than the usual date of July 1 under the old system.

AGRICULTURAL PLANT PEST SURVEY

The West Virginia Agricultural Plant Pest Survey Program is a part of the nationwide National Agricultural Pest Information System (NAPIS). Objectives for this program are to monitor populations of endemic plant pests and to survey for exotic pests not known to occur in West Virginia or the United States. Agricultural crops are monitored for the presence and abundance of insects, plant pathogens and weeds that may cause economic damage and to determine the need for control measures in accordance with the Plant Pest Act of 1967 (Article 12, Section 4, Chapter 19 of the Code of West Virginia).

This program cooperates with the U. S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) and other states to develop standardized survey procedures, detect new and exotic plant pests, monitor endemic plant pest populations, improve data collecting and processing methods and make more accurate control recommendations and crop loss assessments. The use of a national automated data processing system is intended to speed up the processing and summarization of data.

A cooperative agreement for this program between the West Virginia Department of Agriculture and USDA-APHIS is renewed each year based on a review of an annual work plan written by the plant pathologist and entomologist assigned to the program. The work plan outlines what surveys will be conducted, how the surveys will be done and what reports must be filed to comply with the cooperative agreement. This work plan is approved by an advisory committee comprised of representatives from the West Virginia Department of Agriculture, the U.S. Department of Agriculture and West Virginia University.

Agricultural crops of alfalfa, corn, small grains, soybeans and tobacco are monitored for endemic plant pests

and exotic pests not known to occur in West Virginia or the United States. This year, surveys were conducted statewide in those crops for the following endemic plant pests:

Alfalfa -Alfalfa weevil, potato leafhopper, clover root curculio, spittlebugs, alfalfa blotch leafminer, anthracnose, verticillium wilt, common leaf spot, spring black stem, henbit, chickweed, wild mustard and shephardspurse.

Corn - Armyworm, corn earworm, European corn borer, billbugs, stalk borer, western corn rootworm, northern corn rootworm, southern corn rootworm, grey leaf spot, anthracnose, helminthosporium leaf spot, stalk rots, maize dwarf mosaic virus, northern corn leaf blight, fall panicum, Johnsongrass, hemp dogbane and morning-glory.

Small Grains - Armyworm, fall armyworm, cereal leaf beetle, aphids, stem rust, leaf rust, powdery mildew, loose smut, scab, foxtail, cocklebur, and mustard.

Soybeans - Mexican bean beetle, Japanese beetle, green stink bug, potato leafhopper, corn earworm, downy mildew, phytophthora root rot, pod and stem blight, anthracnose, velvetleaf, jimsonweed, Johnsongrass, and cocklebur.

Tobacco - Blue mold, soreshin, black shank, tobacco budworm, tomato hornworm, tobacco flea beetle, pigweed, foxtail, and lambsquarter.

Pest observations were recorded on field data forms and subsequently coded and electronically transmitted to the USDA-APHIS compluter at McClean, VA and the pertinent data were reported to county extension agents and other cooperators and the general public.

Entomology Section

Agricultural Crop Insect Surveys

Surveys were conducted for insects of economic importance in 12 counties covering the different geographic regions of West Virginia. Crops examined on a regular basis included: alfalfa, corn, small grains, soybeans, tobacco, and some vegetables. The major pests surveyed for included: the alfalfa weevil and potato leafhopper on alfalfa; corn rootworm, European corn borer, cutworms and armyworms on corn; cereal leaf beetle on small grains; and Mexican bean beetle on soybeans. At least 2-3 fields of each crop were surveyed in each county. The data collected provided information for each region that was then forwarded to West Virginia University entomologists, county extension agents, and farm cooperators. Data were also entered into the National Agricultural Pest Information System (NAPIS).

Black light traps were operated in 6 counties to survey for nocturnal Lepidoptera and Coleoptera of agricultural importance. Traps were run by cooperating farmers and WVDA field personnel. Specimens were forwarded to Guthrie and processed by a summer field technician.

The survey entomologist and plant pathologist were involved in the planning and conducting of a survey on multiflora rose for rose rosette disease. Surveys also included clipping stem tips for the detection of the eriophyid mite vector and sweep netting to sample all arthropods.

Exotic Pest Detection Surveys

The survey entomologist cooperated with APHIS-PPQ in the detection of exotic insects by pheromone trapping. Fifty traps were placed in 6 counties for detection of the summer fruit tortrix moth, plum fruit moth, and silver-Y moth. All findings were negative for these pests.

Pest Identification Laboratory (PIL)

The survey entomologist assisted the PIL entomologists in identification of insect specimens in the WVDA Reference Insect Collection. The parasitic Hymenoptera were sorted to groups and several insects collected during agricultural surveys were identified and added to the collection.

Biological Control Programs

In conjunction with the agricultural plant pest surveys, the survey entomologist also examined crops for beneficial arthropods, which could be implemented into pest management programs. Surveys were conducted for alfalfa weevil parasites, Coccinella septempunctata (C-7 ladybird beetle) and several other predators and parasites.

Forest Pest Action Programs

The survey entomologist continued to provide assistance to the Gypsy Moth Suppression Program. Under the direction of the forest entomologist, this work involved checking defoliated areas, tree banding and egg mass surveys and planning the 1986 suppression program.

Miscellaneous

The survey entomologist attended several important meetings during the fiscal year which were important to the Agricultural Plant Pest Survey Program and for advancing his professional career and interests.

Several permanent staff and summer employees were indispensable in assisting the survey entomologist obtain data for the agricultural surveys, blacklight trapping, multiflora rose survey, and processing samples in the laboratory. These included, respectively, Ed Bostic, Steve Bostic and Dr. Michael Thomas, from the permanent staff, and Johnny Williams, Terry Stasny and Keith Asbury, from the part-time staff.

Plant Pathology and Weed Section

Agricultural Crop Disease Surveys

The early detection of newly introduced plant pathogens and the regular monitoring of endemic plant disease organisms is vitally important to the agricultural economy of the State. Plant disease epidemics often produce losses in yield, reduced marketability or crop failure. These losses can sometimes be reduced by pest management practices, if the plant disease is quickly detected and accurately identified.

The plant disease survey portion of the Agricultural Crop Survey Program was quite busy during the last fiscal year. The disease conditions in the second half of the 1985 growing season were varied, with grey leaf spot (Cercospora zea-mais) on corn and blue mold (Pernospora tabacina) on tobacco the most significant diseases. Both of these diseases cause some losses in crop yield or value. During the early portion of the 1986 growing season, plant disease problems were minimal, however, drought conditions, particularly in the eastern part of the state, have been severe and this may predispose the plants to plant diseases later in the season.

Nematode surveys were conducted in soybean fields during 1985, with samples being collected from 7 states and assayed for the presence of soybean cyst nematode. All were found to be negative. In addition, soil samples for nematode analysis were collected from each of the regular survey fields during June, 1986. The purpose of this survey is to develop baseline data on nematode populations, i.e., genus, species and number, for the various crops grown in West Virginia. This is a cooperative project with Dr. Jim Kotcen, nematologist at West Virginia University. The results of this analysis will be available in FY 1986-87.

Several meetings or training sessions were attended by the plant pathologist as part of his responsibilities in the NAPIS program. The national meeting for the program was held in Las Vegas, NV, in November, 1985. This meeting serves as a program critique and as a national planning meeting. In January, 1986, he attended a meeting of survey plant pathologists in Lincoln, NE. This meeting was an open

discussion of various plant diseases of interest and concern to plant pathologists working with agricultural crops.

As part of the plant pathologist's activities with the NAPIS program, he serves as vice-chairman of the Sampling and Survey Methods Development Standing Committee. In March, this committee met in Hyattsville, MD, to review survey method protocol used by the various states and to evaluate and compare these methods, then assign reference numbers to each unique method. In April, the plant pathologist helped plan and attend a regional meeting in which survey personnel from 5 states participated, discussing various survey practices and problems associated with the region. Finally, the plant pathologist attended a training session in McLean, VA, where he learned the procedures for entering data into the new NAPIS data-base management system.

Pest Identification Laboratory

The plant pathologist assists with the activities of the Pest Identicication Lab by identifying and recommending control procedures for various plant diseases, weed and horticultural problems within his range of expertise. The plant pathologist handled 706 telephone inquiries, answered 75 letters requesting information and responded to 49 specimens submitted for pest identification during the fiscal year. Three major problems for the homeowner were evident during the last year. Fusarium wilt (Fusarium oxysporium fs. lycopersici) was severe on tomatoes in many home gardens last season, and fire blight (Erwinia amylovora) was very severe on apple trees this spring. Also, a freeze which occurred in late April damaged many fruit trees and was of great concern to the public.

Noxious Weed Program

The West Virginia Noxious Weed Act of 1976 (Chapter 19, Article 12-D of the Code of West Virginia, as amended) provides for the surveillance, suppression and control of certain plants determined to be detrimental to the public health or the economy of the State. Nine plant species have currently been declared to be noxious weeds. They are multiflora rose, Johnsongrass, plumeless thistle, musk thistle, curled thistle, marijuana, opium poppy, kudzu and autumn olive. The Noxious Weed Program has no permanent staff and activities under the program are conducted by existing staff at the expense of other programs.

Biological control of multiflora rose has been the main thrust of the Noxious Weed Program this year. Much of the work has been done in conjunction with the Agricultural Plant Pest Survey Program

In September, 1985, the plant pathologist traveled to Missouri and met with individuals from the University of Missouri and the Missouri Department of Agriculture and individual farmers and orchardists. While there, he examined multiflora rose plants infected with rose rosette disease and discussed its implications with those he met.

During the months following the trip to Missouri, scientists from West Virginia University became interested in this disease and a cooperative agreement was entered into, regarding a research project for the disease. In June, and continuing into July, 1986, intensive survey was conducted in West Virginia for the disease and for the suspected vector and other associated arthropods. This survey covered 147 survey sites selected on a 15-mile grid pattern across the state. The results of the survey will be available during FY 1986-87.

Other noxious weed work included an aerial survey of the 1980 multiflora rose suppression area to determine the amount of reinfestation that has occurred. The results indicate the reinfestation has been heavy and that in most cases the landowner has not continued the suppression work. Also, the cooperative agreement with the Greenbrier Valley Soil Conservation District has been renewed and the multiflora rose suppression work in Pocahontas County is ongoing.

Demonstration Orchard

The demonstration orchard was established at the Guthrie Agricultural Center in 1979 to provide homeowners with an area where they can observe management practices for a small, backyard orchard. Maintenance of the orchard (pruning, weeding and pest control) is a routine part of the plant pathologist's responsibilities. In 1985, the orchard produced 276 pounds of apples. It was estimated that an approximately equal poundage disappeared from the orchard prior to harvest.

Demonstration Vineyards

As a result of House Resolution 15, from the 1983 West Virginia Legislature, the West Virginia Department of Agriculture and, at that time, the Governor's office of Economic and Community Development entered into an agreement to establish demonstration vineyards in southern West Virginia. A total of 5 sites, each approximately 1/2-acre in size, was planted in 1984 and 1985 in Raleigh, Summers, Monroe, Wyoming and McDowell Counties. During the 1985-86 fiscal year, these sites were maintained using generally accepted management techniques, including weed and pest control.

During 1986, assistance with these vineyards, with regard to maintenance, was provided by Rural Resources Division.

In a related project, the plant pathologist, working with the local grape growers, developed the information to support a petition for the establishment of the Kanawha River Valley Viticultural Area. This designation was granted by the United States Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms in April, 1986.

Information and Education

During the year the plant pathologist was involved in several informational and educational activities including preparing and recording 6 radio tapes and 2 television interviews. He prepared 3 news releases and presented 3 talks to garden clubs. He also served as a judge at 3 science fairs.

Miscellaneous

In August, the plant pathologist spent 2 weeks serving as a member of the judging team for the Conservation Farmer of the Year award. On this tour he visited 14 farms, which were selected as district conservation farm winners and judged the farms on their conservation practices.

Periodically, during the year, the plant pathologist assisted with various Departmental or Division activities, including serving on the screening committee of the survey entomologist position and a clerk-typist position.

Stem Rust of Wheat Program

(Barberry Eradication)

This program is conducted under authority of Chapter 19, Article 12 of the Code of West Virginia, effective 1967, amended 1972. The title of this authority is the Plant Pest Act. It further operates under regulations established October 19, 1967, under The Barberry and Black Stem Rust Quarantine.

Stem rust, Puccinia graminis, must complete its life cycle on two host plants, i.e. small grains and the leaves of barberries. As the barberries are removed the cycle is broken and, as a result, valuable wheat, oats, barley and rye crops are protected. Removal of the barberry plant from grain producing areas also reduces the hybridization of the stem rust organisms. These new organisms produce new races of the fungus which have the potential for attacking previously resistant small grain varieties.

Since barberries have such a tremendous seeding and recovery rate, eradication and survey efforts have been targeted to keep bush suppression at or below the present level.

Survey and eradication work was performed in the area of the native barberry (Berberis canadensis) range in Monroe, Greenbrier and Summers Counties this fiscal year. Barberries have been significantly reduced in number in areas of these counties where small grain crops can be affected by the stem rust disease.

Although barberry eradication, survey and control are the primary functions of this program, an extensive and wide range of assignments in other programs are also performed as situations warrant.

Barberry Eradication and Survey

A total of 9,440 barberries was destroyed on 24 square miles (15,360 acres) of land in Monroe County. Additionally, one square mile, consisting of 640 acres was placed on maintenance status.

In Greenbrier County, a total of 495 barberries was destroyed on 7 square miles (4,480 acres) of land. Two square miles, consisting of 1,280 acres, were placed on maintenance.

In Summers County, 350 barberries were destroyed on 2 square miles (1,280 acres) of land.

Stem and Leaf Rust Surveys

A total of 78 stem and leaf rust survey stops was made in southeastern West Virginia this fiscal year. Disease specimens were collected and mailed to the Federal rust laboratory at the University of Minnesota for rust race determination.

Rust surveys are very helpful to determine local rust races, current rust damage to small grain crops and potential rust epidemics.

Agricultural Plant Pest Detection and Density Surveys

Assistance was again given to the survey program staff with pest surveys on the major agricultural crops produced in southeastern West Virginia throughout their growing seasons.

Data in regard to harmful crop insects, diseases, weeds and deficiencies were reported as required.

The most significant findings in Monroe and Greenbrier Counties were:

Alfalfa - Common leaf spot, Lepto. leaf spot, Stemphylium leaf spot, spring black stem, alfalfa weevil, potato leafhopper, broadleaf dock, broadleaf plantain, dandelion and chickweed. Deficiencies consisted of iron, boron and potassium.

Corn - Northern corn leaf blight, grey leaf spot, Helminthosporium leaf spot, corn earworm, European cornborer, western corn rootworm, northern corn rootworm, fall panicum, hemp dogbane, pigweed and velvetleaf.

Small Grains - Leaf rust, net blotch, cereal leaf beetle, pigweed, ragweed, velvetleaf and morning-glory.

White Pine Blister Rust Control

Assistance was again given the White Pine Blister Rust Control Program this fiscal year. Control area examination work was performed in Monroe and Greenbrier Counties.

A total of 13,108 control acres was examined for the presence of the blister rust disease, Cronartium ribicola, and/or ribes (the alternate host plant) in Greenbrier County this fiscal year.

In Monroe County, a total of 4,765 control area acres was examined.

In addition, 4 white pine plantations in Monroe County containing 28,000 trees and 1 plantation consisting of 150 acres (no tree count available) were also examined.

Gypsy Moth Trapping

A total of 167 gypsy moth survey traps was removed from grid points in Monroe and Greenbrier Counties during August of 1985. A total of 375 traps was placed again on grid points in June of 1986. More traps were placed in 1986 because the trapping program was intensified in the two counties.

Three extra traps were also placed around the state fairgrounds. A single male moth was trapped near the fairgrounds in August of 1984, but none were found in traps placed there in 1985.

Miscellaneous - Other Cooperative Programs

Maintenance work (mowing, spraying, setting posts and building trellises) on the state's demonstration vineyards in

Monroe and Summers Counties was performed during the first half of this fiscal year.

An employee from the Rural Resources Division of the Department was assigned the vineyard work during the spring and early summer of 1986.

Two emergency days were spent to survey the November flood damage to agricultural areas along the Greenbrier River in Summers County on November 10 and 11.

A black light trap was set up and maintained in Monroe County during the insect season in order to survey local populations of harmful agricultural night flying insects. Trapped insect specimens were mailed to the State survey entomologist for identification.

Surveys for the musk and curled thistle head weevil, Rhinocyllus conicus, will be done in July of 1986, as the weevil larva does not fully develop in time to survey effectively sooner.

To Maintain a Field Office

The Department field office and storage area was maintained as usual during this fiscal year. It was utilized as a space to do necessary reporting and filing of records and maps for work done in southeastern West Virginia. Additionally, in return for it serving as a storage and maintenance area for cooperative Federal (USDA) vehicles and equipment, Program employees were permitted to use the Federal vehicles and equipment for State projects.

APIARY PROGRAM

The primary mission of the Apiary Program is to promote beekeeping as a branch of agriculture in West Virginia. This requires minimizing the incidence of apiary diseases by inspection of apiaries and destruction or treatment of diseased hives under the authority of Chapter 19, Article 13 of the Code of West Virginia, effective 1969. The program is also designed to educate beekeepers in disease control and management techniques and to stimulate public awareness on the role of honeybees in food production.

Apiary Inspection, Certification and Destruction and Treatment of Diseased hives

Inspection requests received	56
Inspection requests answered	44
Beekeepers inspected	159
Apiaries inspected	277
Hives inspected	2,742

Honey production in West Virginia totaled 826,000 pounds during 1985, which indicates a 6% reduction from the 880,000 pounds produced in 1984. The average production per colony was estimated at 41.3 pounds. The number of producing colonies remained at 20,000. However, this figure does not reflect the total colonies estimated to be in West Virginia, but only those surveyed by the West Virginia Crop and Livestock Reporting Service (now West Virginia Agricultural Statistics).

BIOLOGICAL CONTROL PROGRAM

The Biological Control Program is conducted under authority of the Plant Pest Act of 1967, as amended 1972. It is designed to conduct, or assist others (government agencies, universities, individuals, etc.) in conducting biological control programs, primarily against economically important imported pests, in order to reduce reliance on chemical control and maximize implementation of integrated pest management practices.

The objective of applied biological control is to improve the relationship between parasites, predators and pathogens and the pest species so as to maintain the undesirable species at population levels lower than would occur in the absence of these natural enemies. Biological control is probably the oldest known method of insect control and it continues to play an increasing role in the management of agricultural and forest pests.

There are 3 important benefits that can be realized by successful biological control programs. First, biological control is environmentally safe to humans and other non-target organisms. Second, biological control can be relatively permanent, needing little or no supplemental maintenance. Third, biological control is economical with many programs realizing substantial savings over other means of pest control.

Gypsy Moth Biological Control

Survey for the Occurrence, Abundance and Geographical Range of Gypsy Moth Parasites Presently Found within West Virginia - During the spring and summer of 1986, a total of 1,384 gypsy moth larvae was collected from 18 separate locations in the Eastern Panhandle as a survey for endemic gypsy moth parasites. All collected larvae were returned to the Inwood insect rearing building where they were put on prepared gypsy moth diet. Every 2 to 5 days these larvae were observed for the presence of parasites. When possible, 3 collections were made at each sample site to ensure that the full range of larval parasites was collected. As of June 30, 1986, the following parasitic life forms had been

recovered: 17 adult tachinids, 24 unidentified fly puparia, 5 adult wasps, and 21 wasp cocoons. All wasp cocoons and fly puparia will be held in the insectary until eclosion has taken place and the parasites can be positively identified.

A total of 540 gypsy moth pupae from 6 separate locations in the Eastern Panhandle was collected and held for parasite emergence. A total of 22 ichneumonids and 1 chalcid wasp was recovered from these pupae.

Investigate the Occurrence, Abundance and Seasonal Distribution of Potential Gypsy Moth Parasite Alternate Hosts - To investigate the occurrence and abundance of potential gypsy moth parasite alternate hosts, banding sites in Hampshire, Morgan, Berkeley and Jefferson Counties were inspected for Lepidoptera that overwinter as larvae. These could be potential alternate hosts for gypsy moth parasites and provide a means for these parasites to overwinter. Of particular importance was the presence of Dasychira meridionalis, which is known to overwinter in the larval stage. Two sites were located with D. meridionalis present. Consequently, 4 species of gypsy moth parasites were obtained from the U.S. Forest Service and released at these sites in the fall of 1985. The gypsy moth parasites released include: Cotesia schaferi Marsh, Glyptapanteles flavicoxis Marsh, Hyposoter lymantriae Cushman and Rogas lymantriae Watanabe. Subsequent larval and pupal collections at these release sites during the spring of 1986 showed no evidence that any of these released parasites overwintered.

Parasite Release and Monitoring - The only release of parasites for gypsy moth control during the previous year were those mentioned in the previous key result area. Monitoring of the spring 1985 parasite release sites was conducted and no released parasites were found to have overwintered.

Work Toward Integrating Biological Control Measures into the overall Gypsy Moth Population System - As mentioned under Program Administration, the F-1 inherited sterility project was substituted for this key result area.

Gypsy Moth Spray Project

During this year's gypsy moth aerial suppression program, the biological control specialist performed duties as needed. Those duties included the loading and unloading of pesticides and assisting with the operation's information program. In addition, assistance was provided earlier in the year with gathering egg mass density data.

Musk and Curled Thistle

Due to commitment to the F-1 inherited sterility project and construction of the outdoor insectary, no progress was made concerning this key result area.

Pest Identification/Information/Control Recommendations

During the past year a total of 58 pest related calls were received at the Inwood office. When appropriate, the insect pest was collected and identified either at Inwood or through the Pest Identification Laboratory in Charleston. When needed, control recommendations were given to the individual. The majority of this year's calls involved the gypsy moth.

Gypsy Moth Inherited Sterility Egg Release Program

In late January of 1986, an agreement was finalized between the WVDA and the USDA to conduct a cooperative gypsy moth inherited sterility egg release program in West Virginia. The overall objective of this project was to evaluate the use of inherited sterility for suppressing low-density/building gypsy moth populations by a large scale aerial application of sterile eggs. The specific objectives of this project included:

1. Demonstrate suppression.

2. Demonstrate competitiveness of F-1 sterile insects with wild populations.

3. Assess the overflooding ratio (sterile/wild) following establishment of first-stage larvae, during pupal stage and male flight.

4. Develop aerial release technology for applying F-1 sterile eggs.

Utilizing the 1985 gypsy moth suppression egg mass survey data, the decision was made to conduct this study on Short Mountain Public Hunting and Fishing Area.

On April 11, 219,000 F-1 sterile egg masses were applied to a 458 acre Short Mountain study plot. The eggs were dropped from an aircraft provided and piloted by USDA-APHIS. This application was made 6 days before the first observed wild egg hatch on Short Mountain. Hatch synchrony between sterile eggs and wild endemic eggs was monitored and good synchrony was observed between both groups.

To establish the larval overflooding ratio between sterile and wild gypsy moths at Short Mountain, approximately

1,200 first instar larvae were collected from the forest canopy and returned to the Inwood rearing facility. The larvae were placed on artificial diet and reared through to the adult life stage. The adults obtained through this process were mated with fully fertile moths supplied by the U.S. Forest Service. A sterile-fertile mating will yield no offspring. All egg masses obtained through this process were held for fertility analysis, which will be conducted during the fall and winter of 1986.

Following the development of first instar gypsy moth larvae into second instar larvae, weekly trips to the study area were required to monitor larval development. Also noted was the presence of parasite cocoons, and tachinid fly eggs and puparia. Identification of these parasites will be completed when they have fully developed and emerged.

Program Administration

During the past year, 2 planned items that were not accomplished include the integration of biological control measures into the overall gypsy moth population management system and work involving musk and curled thistle biological control. A commitment to the F-1 inherited sterility project and the construction of the insect rearing building were substituted for these planned objectives. The planning and necessary arrangements for the cooperative F-1 inherited sterility project were not initiated until after the 1986 work plan was finalized. Therefore, this project was not included in the 1986 work plan.

Miscellaneous

The 1986 Biological Control Program required the rearing of 2,000 to 4,000 gypsy moth larvae at the Inwood office. To facilitate this rearing program an insectary/storage building was planned and constructed. The insectary eliminated the need for storing large numbers of insects in the Plant Pest office, as was done in the past. The storage area of the building is being used by the Rural Resources Division and the Plant Pest Control Division. Space was made available for storage of the lawn tractor and other maintenance materials in the new structure.

During the past year, the biological control specialist also participated in a cooperative gypsy moth egg mass study between WVDA and the U.S. Forest Service out of Morgantown. Coordinating the project was Dan Twardus of the U.S. Forest Service. A total of 9 (25 acre) study areas was sampled. Information concerning egg mass densities was obtained from each of the areas using 1/40 acre fixed plots, 20 BAF fixed and variable plots and the 5-minute walk. Egg masses were collected from each of these plots to determine percent parasitism and the presence of virus. Statistical analysis

of this data is presently being conducted by the U.S. Forest Service.

COOPERATIVE FOREST PEST ACTION PROGRAM

This program provides for forest insect and disease surveillance and detection programs, and, when necessary, forest pest eradication or abatement programs, all under authority of the Plant Pest Act of 1967, as amended 1972. The program participates in a formal agreement with the United States Forest Service (USFS) and cooperates with the West Virginia University Plant Pathology Department, the USFS and the Forestry Division of WVDA in conducting surveys, identifying causal agents, delimiting infestations, planning control programs, and assisting citizens of West Virginia in forest insect and disease related problems. The activities of the Program are administered and carried out by the Forest Entomology and Forest Pathology Sections. Primary section programs include Gypsy Moth, White Pine Blister Rust and Oak Wilt.

Entomology Section

During fiscal year 1986, the insect again receiving the most attention was the gypsy moth. Other native insects caused little damage or were of minimal concern to residents of West Virginia.

The second year of defoliation by gypsy moth was recorded in June, 1986. Approximately 8,250 acres of hardwoods were defoliated by the gypsy moth in Jefferson, Berkeley, Morgan, Hampshire and Mineral Counties.

Mortality to oaks was observed in the Eastern Panhandle where the gypsy moth defoliated approximately 2,400 acres in 1985. An area in the Glenwood Forest housing development on North Mountain experienced heavy mortality to oaks.

Gypsy Moth

Detection, Abundance and Defoliation Surveys - The gypsy moth project, again this year, accounted for more hours than all other pest problems combined. Three full-time employees and 8 part-time employees worked full-time on conducting egg mass surveys, banding trees, monitoring treatment areas, obtaining information on parasites and general detection for larvae, pupae or pupal cases and egg masses.

The trapping program for male moths in 1985-86 was supplemented by the U. S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), with a state cooperative funding project for southwestern West Virginia, and a trapping program conducted by APHIS personnel in the

northern section of West Virginia. All counties were trapped on a grid pattern of 1-trap-per-4-square-miles. Additional trapping was conducted on a 1-trap-per-4-square-mile grid by the WVDA's Plant Pest Control Division in Pocahontas, Pendleton, Greenbrier, Mercer, Summers and Monroe Counties. The counties of Wood, Ritchie, Gilmer, Braxton, Nicholas, Fayette, Kanawha, Clay, Roane, Calhoun, Wirt and Jackson were trapped on a random basis by the WVDA Forestry Division. Additional traps were placed in the state parks and state forests. The only counties not trapped for gypsy moth were Grant, Hardy, Hampshire, Mineral, Morgan, Berkeley and Jefferson. These counties are currently infested with varying degrees of infestation by gypsy moth and are monitored using a different method.

The counties having male moth catches in 1985 and the numbers were Pendleton - 150, Randolph - 52, Pocahontas - 2, Tucker - 146, Preston - 210, Barbour - 18, Upshur - 2, Taylor - 18, Monongalia - 30, Marion - 9, Harrison - 8, Wetzel - 1, Tyler - 1, Ritchie - 4, Wirt - 2, Marshall - 5, Ohio - 11, Brooke - 51. and Hancock - 14. New county records were Wirt and Gilmer.

Burlap banding of host trees continued throughout the Eastern Panhandle and in counties adjacent to infested counties. No new county records or new infestations were noted in areas outside of the previously infested counties.

The egg mass surveys conducted in early and late fall indicated the need to treat approximately 83,000 acres in the spring of 1986. The areas treated in the spring of 1985 showed a definite reduction in gypsy moth and none were scheduled for retreatment. The areas treated in 1985 had an average reduction of 90+ per cent.

Aerial flights conducted in June,1986 revealed that 8,570 acres of forest land were defoliated. Of this total, 8,250 acres were caused by gypsy moth and 320 acres were of unknown origin. The following defoliation was recorded: Jefferson County - 60 acres, Berkeley County - 4,560 acres, Morgan County - 1,020 acres, Hampshire County - 1,995 acres, and Mineral County - 935 acres. The biggest part of this acreage can be attributed to areas on Sleepy Creek Public Hunting and Fishing Area that were set aside for cooperative research purposes and to encroachment from unsprayed areas in Maryland and Virginia.

Suppression - The treatment plans for gypsy moth began in the early fall of 1985, and approximately 83,000 acres of forested land were selected for treatment in Berkeley, Morgan, Hampshire and Mineral Counties. Adjustments were made in the total acreage several times, due to a pending Federal injunction, which would prevent cost-sharing for gypsy moth if a state was using chemicals rather than a

biological insecticide. The changes in actual areas to be treated were necessary, due to limited State funds, if cooperative Federal money was not going to be available. The decision was made to treat less than 83,000 acres, pending a lifting of the injunction. The injunction was lifted during the actual treatment dates and the original figure of 83,000 acres became the target.

The aerial applicator bid was revised and sent to prospective bidders. The contract was awarded to K & K Aircraft of Bridgewater, Virginia. However, problems in the normal signing procedure delayed the contract and actual work could not start on the day planned.

As stated earlier in the report, public meetings were held to discuss the proposed gypsy moth treatment areas. The public meetings are part of the overall project and help to answer many questions posed by landowners.

The actual treatment program began on May 5, when the aircraft arrived at Martinsburg Regional Airport, where they were calibrated and inspected. The treatment began on the morning of May 6, and ended May 13 with the treatment of 83,410 acres of forested land in Berkeley, Morgan, Hampshire and Mineral Counties. The weather during the operation was excellent with the only delays occurring on days when wind, fog or another unsuitable condition existed. The equipment and aircraft supplied by the contractor were in excellent condition and breakdowns were of minor importance.

All areas were treated with Dimilin except a 700-acre block that was designated as research for different formulations of the biological insecticide Bt. All of the Dimilin treated areas, except a 725-acre block were treated at the rate of 2 ounces 25W (.03 lb. active ingredient) per acre in total volume of one gallon of water to the acre. The 725-acre block was treated with Dimilin at 1 ounce (.015 lb. active ingredient) per acre in total volume of one gallon of water to the acre.

Several different formulations of Dimilin were applied to different blocks of forested land. All formulations were applied at the rate of .03 pounds active ingredient per acre in total volume of one gallon of water to the acre and were as follows: 750 acres treated with an aqueous Dimilin (4 pound gallon) and 373 acres with an oil Dimilin (2 pound gallon) in 3 quarts of water and one quart of superior oil.

Additionally, 900 acres of the total 83,410 acres were treated in a research project involving wildlife, invertebrates and birds. These six 150-acre blocks were located in Sleepy Creek Public Hunting and Fishing Area. Three of these blocks were treated in May, 1985. This would make two years of treatment for these blocks. This project

was done in cooperation with the West Virginia University School of Forestry's Wildlife Division.

Another project involving the early application of Dimilin to forested areas was planned in the fall of 1985, and treatment took place in May, 1986. The project called for the application of 2 formulations of Dimilin at 4 different intervals. The formulations were Dimilin 25W and Dimilin Oil 2F. At each interval, three 100-acre blocks were treated with 25W, and 3 with 2F.

The time frame for application was April 2-3 (before bud break and no insect hatch), April 14 (10% egg hatch), April 27 (bud break and 100% hatch, and May 12 (normal or standard time). A total of 2,400 acres was treated during this time frame. The areas treated and control blocks were monitored and final evaluation will be made in the fall of 1986. This project was carried out with the cooperation of the USFS, APHIS, UNIROYAL and WVDA. The project was designed to evaluate the efficacy of Dimilin applied at three different early times and compare those to standard timing. If acceptable efficacy can be demonstrated, this will broaden the time frame available for Dimilin application and provide more options to pest managers.

The success of all treatment programs will be evaluated when egg mass counts are conducted in the fall of 1986.

Field personnel responsible for collecting data were Quentin "Butch" Sayers, Norman Dean, and part-time personnel Arnold Mills and Mark Wagoner, and 6 others.

Native Forest Insect Surveys

Forest insect surveys were conducted for various native insects throughout West Virginia. The eastern tent caterpillar, which normally causes great concern with urban dwellers, was practically nonexistent in most of West Virginia. Several nests were observed in eastcentral West Virginia, but defoliation did not take place. A polyhedrosis virus and tachinid fly are primarily responsible for reducing the population. These low populations can be expected to remain down for several years yet, but they will eventually outpace controlling factors as they cycle up again.

The locust leafminer continued at low levels in southern West Virginia. However, major infestations during 1985 were noted in the eastern section of West Virginia. The feeding on black locust by the beetle was extremely heavy and brown foliage caused by the feeding was noted throughout the affected area.

The fall webworm, which had been abundant in the fall of 1984, apparently subsided and few nests were observed in

the fall of 1985. This insect is sporadic and surveys to determine outbreaks are inconsistent.

The yellow poplar weevil, Odontopus calceatus, did not cause damage as expected in the summer of 1985. However, in June 1986, the feeding damage by the weevil was extremely heavy in the Kanawha Valley area. Yellow poplar leaves were damaged, and numerous brown leaves could be observed.

In 1985-86, ambrosia beetles caused considerable damage to treated yellow poplar rails at Belington, Ellamore and Spencer. Ambrosia beetles are cited in the literature as attacking only lumber, logs, etc., with a moisture content over 48%. In all instances, fresh cut rails, lumber, landscape ties, etc., were not infested. The only items being attacked were CCA-treated yellow poplar rails and landscape ties. In a related incident, CCA-treated, uninfested yellow poplar lumber was brought to Charleston and stored on a patio. After several days, a flight of ambrosia beetles attacked this lumber and caused damage. It is possible that the CCA treatment attracts ambrosia beetles and research may be needed to clarify this apparent problem.

The orangestriped oakworm was observed to be locally abundant on oaks throughout West Virginia. If this insect is building in population, higher numbers should be evident in the fall of 1986. Populations will be monitored to see if defoliation occurs.

Surveys for the oak leaftier were conducted throughout the eastern counties of Pocahontas, Randolph, Tucker, Greenbrier, Pendleton, Hardy and Grant. An infestation had been noted in Elkins (Randolph County) in 1985. However, surveys indicated that no infestation would occur. A follow-up in May, 1986 confirmed that the population in Elkins had collapsed and no defoliation was evident. The area in Elkins did, however, have extreme mortality to scarlet oaks, which were defoliated in the spring of 1985.

Surveys for the fall cankerworm were conducted throughout the same counties as the oak leaftier. The results of the surveys indicated that this insect would not cause any noticeable defoliation. An area of 320 acres defoliation in Hampshire County on Short Mountain was found during aerial surveys in June, 1986. This defoliation was not caused by gypsy moth, but rather is thought to be from fall cankerworm or one of the loopers. This will be checked in the fall of 1986 or spring of 1987.

Information and Education

Tours and camps were arranged and attended. These were: Conservation Camp, the National 4-H Forestry Invitational, the State 4-H Forestry Competition, Forest

Industries Camp, the Webster County Nature Tour and the Annual Wildflower Pilgrimage at Black Water Falls State Park. Other tours were conducted for various groups and individuals, garden clubs, schools and scouts.

Numerous talks and programs were presented throughout the year. They include: radio talks with WVDA's Doug Hudson an a scheduled basis; radio talks with local stations on various topics; and programs and talks presented to colleges, forestry groups, garden clubs, schools, civic organizations, professional societies, and various committee meetings.

The Mountain State Forest Festival is attended on an annual basis and a display depicting forest insects and diseases is set up and manned by Program personnel.

Program Administration

Forest Entomologist and Program Leader Alan R. Miller, was elected as vice-chairman of the National Gypsy Moth Management Board during the National Gypsy Moth Review, held at Columbus, Ohio during November 18-21, 1985. The vice-chairman will serve as chairman in 1988-89.

A Gypsy Moth Coordinator position was added to this program in 1985. The position was filled by long-time staff Survey Entomologist Jan Hacker. His responsibilities will be to supervise and assist with all field activities and report to the program leader.

The program leader continues to serve as Chairman of the protection Committee of the Society of American Foresters, West Virginia Chapter, as Co-chairman of the Agriculture and Forestry Alumni Association of West Virginia University, as Assistant Director of the Forest Industries Camp and as Secretary of Conservation Camp.

The combined Entomology and Pathology Sections employ 10 full-time personnel that work on various programs. Five of these work on the gypsy moth project, one is a forest pathologist that works with forest diseases and four are responsible for white pine blister rust control activities. Approximately 12 summer (or part-time) employees are hired to assist with the various activities. The largest number of part-time personnel, which is 8, work with the gypsy moth project.

A cooperative agreement is completed each year and submitted to the USFS for cooperative funding for the Cooperative Forest Pest Action Program and the Gypsy Moth Suppression Project. These funds are on a 50/50 matching basis. The Cooperative Forest Pest Action Program reimbursement is limited to $40,000. Reimbursement claims

are submitted on a Federal fiscal year basis (October 1-September 30), or upon completion of the project.

The annual Forest Insect and Disease Calendar, which is in great demand from cooperators, was prepared and mailed. This calendar depicts forest insects and diseases (in black and white) that occur in West Virginia. The bottom section contains timely information on detection or treatment of various insects and diseases. A time-table for reporting accomplishments (quarterly reports, annual reports, etc.) is included.

A quarterly newsletter, that provides current information on forest insects and diseases, is sent to cooperators and other concerned individuals.

Public meetings to address the Gypsy Moth Suppression Project were planned and held December 9, at Slanesville, on March 25 at Cacapon State Park, and March 26 at the Berkeley County Public Library in Martinsburg. These meetings are designed to address the issues or concerns that landowners may have on the proposed project. No issues or concerns were voiced during the December 9 and March 25 meetings. However, 2 individuals did voice opposition to treating at the March 26 meeting. The opposition was not based on factual information and the only real concern was that they did not want insecticides applied by air to forested lands. The greatest concern of individuals attending all meetings was making sure their land would be treated. If not selected for treatment, they desired to know why they were omitted.

Pathology Section

The primary responsibilities of the forest pathologist are to conduct disease surveys and investigations in hardwood and conifer stands. The surveys are necessary in order to detect the presence and severity of native and introduced diseases so that healthy forests can be maintained. Disease epiphytotics may cause growth loss, a reduction in log grade or tree value and tree mortality. Information on disease incidence can be used to reduce these losses. Work was accomplished as scheduled in each of the major areas of the work plan except the American Chestnut Improvement Project. The reasons for this are explained in the report under that section.

Tree Disease Surveys and Investigations

Hardwoods - During the fiscal year a new disease of black cherry was discovered in West Virginia. Cytospora canker (Cytospora leucostroma) was initially noted on wild black cherry in Preston County. Joint surveys with the U. S. Forest Service's State and Private Forestry section (USFS-S&PF), as well as representatives of the states of

Pennsylvania and Maryland, were conducted to determine the range of this disease. The disease was found in 8 northcentral counties in West Virginia. In addition, this disease was found in 7 Pennsylvania counties and 2 Maryland counties. A joint publication of the survey results was published in the scientific journal "Plant Disease".

Reports of a devastating new disease of dogwood trees in the Northeast prompted surveys in West Virginia. The disease, known as dogwood anthracnose, is caused by the fungus Discula sp. The first report of this disease was from a dogwood tree at Cooper's Rock State Forest during 1985. Subsequently, this disease was observed in Jefferson County, West Virginia by Field Agent Norman Dean. A trip was made to Jefferson County at Wilson's Gap to collect samples and document the find.

Oak decline, a disease prevalent during the 1950's in West Virginia appears to be on the increase in West Virginia again. Drought conditions the past 4 growing seasons appear to have been the primary problem. The root rot fungus Armillaria mellea, the canker rot organism Hypoxylon pruinatum and an insect, the two-lined chestnut borer, Agrilus bilineatus, are most commonly associated with declining trees. In addition, insect defoliation has contributed to the decline problem in certain sections of the state. Investigations into this problem have been conducted in Jefferson, Berkeley, Morgan and Mercer Counties.

A cooperative study was conducted with researchers at West Virginia University (WVU) on a disease of oaks known as bacterial canker. Infections generally occur in local areas on the lower trunk. A number of different genera of bacteria have been isolated from the fluxing cankers. One of the bacteria, an Erwina sp., appears to be the causal organism. The forest pathologist co-authored a paper on the topic for the annual American Phytopath meetings at Reno, Nevada entitled "Bacteria Associated With Flux From White Oaks" by M. L. Double, G. K. Bissonette and S. C. Haynes.

Changes in oak export regulations prompted changes in the aerial oak wilt survey. Each year, 16 high oak wilt disease incidence quadrangles in the Eastern Panhandle and 20 disease incidence quadrangles in the southern portion of the state are aerially surveyed. Surveys were also conducted over the 4 counties in which no oak has ever been found and 9 counties in which oak wilt has been found on only a few occasions. Since all red oak and white oak logs must now be fumigated before being shipped, the survey was dropped over the no and low-incidence counties. Surveys are still conducted over the 16 Eastern Panhandle quadrangles and 20 southeastern quadrangles.

Conifers - A variety of disease problems were detected in surveys of Christmas tree stands. Pine root decline (Verticicladiella procera) continues to be a serious problem in white pine plantings. A new foliage disease of white pine was discovered. The needlecast caused by the fungus Meloderma desmazeeri was found in a Braxton County plantation. Rhizosphaera needlecast disease incidence appears to be increasing in blue spruce and Norway spruce plantings. Naemacyclus needlecast and lophodermium needlecast were noted in some Scotch pine plantings, but generally weren't very serious.

Greenhouse Study

A greenhouse study to investigate the role of 3 root rot pathogens in the mortality of white pine, Douglas fir and Fraser fir was completed during the fiscal year. The root rot pathogens Phytophthora cinnamomi, P. cactorum and Verticicladiella procera were inoculated into seedlings. Although the results were inconclusive, P. cinnamomi was the only pathogen that killed seedlings in the study. The pathogen P.cactorum could be reisolated from latent infections on the root systems of all 3 seedling species. Seedlings inoculated with V. procera appeared perfectly healthy at the termination of the study. In addition, we were unable to isolate V. procera from the roots of the inoculated seedlings.

Pest Identification Laboratory

General - The forest pathologist assisted with the Pest Identification Laboratory by identifying and recommending control measures for the various disease and weed specimens in his area of expertise. In addition, phone calls and written requests for information were responded to. During the fiscal year, the forest pathologist answered 608 phone calls, completed 124 specimen identifications and responded to 34 written requests.

Wooden Pallet Problem - Forester Tom McKissic of the Forestry Division contacted the forest pathologist regarding a problem at a wood pallet plant in Wood County. Two shipments of pallets from the Gatewood Products Plant, valued at $12,000.00, had been rejected by an Ohio cannery company. The rejected pallets were covered with a white fungal growth. The pathologist determined that the fungal growth was arising from incipient decay in the lumber. Suggestions were provided to salvage the 2 pallet shipments and correct problems at the plant.

Shiitake Experiment

Efforts continued on the Shiitake mushroom production experiment. Spawn was started in February in the laboratory.

In May, the spawn cultures had developed enough for inoculation. On May 14, 20 oak logs were inoculated with the Shiitake mushroom spawn. A total of 40 logs have now been inoculated with the fungal spawn. Initial mushroom production is anticipated during the fall of 1986.

Information and Education

During the fiscal year, the forest pathologist prepared 3 radio tapes and gave 1 television interview. Talks on pathology were given to civic groups, students at Forest Industries Camp, as well as service foresters at a training session. In addition, the forest pathologist assisted with 2 Christmas Tree Growers Workshops as well as a Shade Tree Maintenance Workshop. At the request of the Dairy Goats Unlimited Club of Pt. Pleasant, a talk on "Poisonous Plants" was presented. A forest protection exhibit was maintained at the Mountain State Forest Festival in Elkins. The forest pathologist assisted with the State and National 4-H Forestry Invitationals, in addition to judging exhibits at the Kanawha County Science Fair. The Forest Insect and Disease Newsletter was prepared on a quarterly basis and the annual Forest Insect and Disease Calendar was prepared and distributed in December.

Program Administration

During the fiscal year the forest pathologist was assigned supervisory responsibility for the White Pine Blister Rust Program out of the Guthrie office, and was directed to prepare a program evaluation for the Commissioner. After reviewing the evaluation, the Commissioner decided to phase out the program over a 2, possibly 3-year period. A spot check survey is to be instituted in place of the current survey.

In excess of 10 days of program time were spent working with the blister rust crews. The record keeping system was reviewed and pre-suppression and post-suppression surveys were participated in. Supplies were requisitioned and delivered as needed. Both crews appear to be doing a very thorough job.

Miscellaneous

During the fiscal year, the forest pathologist investigated several cases of herbicide misapplication. The most serious problem occurred at Burnsville Lake. Chemtrol Chemical Company had contracted with the U. S. Army Corps of Engineers to apply herbicides on gravel camping sites. Trees and shrubs around the campsites incurred extensive damage. Apparently, the chemical company applied the herbicides during a rain. The herbicides washed from the application

sites to nontarget areas. Samples were collected and analyzed and a report was submitted to the area manager.

During November, the forest pathologist worked in the flood ravaged area of the state assessing damage to farms. Four days were spent in Webster and Randolph Counties on this project. Only 11 farmers in Webster County suffered damage. Many more farmers were affected in Randolph County.

White Pine Blister Rust Program

This year, 52,734 acres of land were surveyed for Ribes bushes (the alternate host for white pine blister rust disease) and for diseased pine. Suppression activities took place on 3,035 acres with 7,797 Ribes plants destroyed.

A total area of 414,906 acres occurs within the control zone on state and private land. White pine occurs on 224,934 acres of control zone land. The National Forest Control Zone encompasses 124,610 acres with white pine on 70,591 acres.

American Chestnut Improvement Project

With the death of Bruce Given, project leader for chestnut blight work, little work was accomplished on the chestnut improvement project. The forest pathologist deburred the thousands of nuts that Bruce had collected. The nuts were given to Al Allison, Forestry Division, for planting at Parsons. The nuts were planted in October and washed out by the November flood. In addition, replacement seedlings to be planted at the Lakin genetic orchard, were destroyed by the Parsons flood. Responsibility for the genetic orchard was transferred to the Forestry Division.

J.B. MCLAUGHLIN AGRICULTURAL LIBRARY

The J.B. McLaughlin Agricultural Library is a literature and literature services resource center that supports the work of the Department's professional staff. It provides an organized retrievable setting for the reference literature that is indispensable to staff activities. The responsibility for maintaining and supervising the library was delegated to the Plant Pest Control Division in 1981. It is staffed by a retired librarian on a part-time basis, who receives support from an inter-divisional library committee, chaired by the Plant Pest Control Division member. It is listed in the West Virginia (library) Union List, which makes its resources available on a statewide basis. Outside requests for literature and use are received from state colleges and universities, other state agencies and the general public.

Currently, the library's holdings include 4,200+ books and documents, 659 bound periodical volumes, a large number

of unbound periodicals and 225 boxes of pamphlets and technical papers.

Organization

This year, the librarian's principal goal continued to be the complete integration of all Department holdings into one library. In practice, this goal could not be pursued full-time due to maintenance and staff support services activities. In spite of these latter activities, 558 books and 541 pieces of technical literature were cataloged and indexed.

Additional organizational accomplishments included: finishing the physical integration of the old Plant Pest Control Division Library's technical file with that of the Department's old capitol library, inventorying and updating the status of all books on both short and long term loan and having stacks of unprocessed technical literature screened by staff for cataloging and indexing.

Maintenance

Principal maintenance activities during the year included: updating the library's Union List of Serials for the West Virginia University Library, with the final tally coming to 86 journals; preparing and distributing, within the Department, alphabetical and subject listings of journals; preparing 59 journal volumes for the bindery; and initiating a thorough compilation of journal data to determine whether a jobber for journal subscriptions is economically feasible. Work on the latter had progressed through the letter "C" at year's end.

Support Services

Eleven literature searches were performed for library patrons during the year and instructional tours were given to new personnel requesting them in the Quality Control, Plant Pest Control and Forestry Divisions.

Administration

Sources of free reference material were checked regularly to supplement the library's holdings. The following major works were acquired from the indicated sources: (1) Union Carbide Library, the Standard Periodicals Dictionary; (2) South Charleston Public Library, Books in Print, author subject, and title volumes and (3) National Agricultural Library, Index of American Economic Entomology, West Virginia University Agricultural Experiment Station Bulletins and Circulars, now bound in 18 volumes, with more unbound, Journal of Agricultural and Food Chemistry - v.1-10, Analytical Chemistry - v.30-35, Plant Disease Reporter-

v.42, American Journal of Veterinary Research - v.43, Journal of the AVMA - v.181, Parasitology - v.80-84, Veterinary Medicine - v.40-54, Veterinary Pathology - v.15-17, J. of Dairy Science - v.39 to present, Separation Science and Technology - v.1-15, Soil Science - v.89-116, and Weed Science - v.16-25 and 27-30.

Planning for library computerization was initiated by exploring the feasibility of joining the State Library Commission's computer system. The plant pathologist and the librarian pursued this alternative by attending a demonstration of the system in December, after which, the recommendation was made to the library committee chairman to drop the idea due to the high cost of tying-in and the fact that the system is oriented to public libraries.

NURSERY INSPECTION AND REGISTRATION PROGRAM

The Nursery Inspection and Registration Program is charged with enforcing those articles of the West Virginia Plant Pest Act (Article 12, Section 19, of the code of West Virginia, as amended) that pertain to the sale or distribution of nursery stock. These include: (1) the annual or periodical inspection of all nursery stock available for distribution; (2) the annual registration of all in-state nurseries, nursery dealers, and agents of these businesses; and (3) the enforcement of all in-state plant quarantines. The Nursery Inspection Program has the added responsibility of seeing to it that plant products leaving the state comply with all regulations of the state receiving such plant shipments.

The Nursery Inspection and Registration Program serves the consumer by helping to prevent the marketing of diseased or insect-infested nursery stock. The program also serves other horticultural interests of the state by helping to prevent or retard the dissemination of foreign plant pests which might otherwise enter the state on nursery stock.

Concerning the annual registration of all establishments involved in the growing and distribution of nursery stock, those establishments that grow nursery stock must obtain a Nursery Certificate and pay a $20.00 registration fee. Businesses that buy and resell nursery stock, but do not grow the plants they sell, are required to register as Nursery Dealers and pay a $40.00 registration fee for each outlet they operate. Persons soliciting orders for nursery stock while under the direct supervision of a registered nursery or nursery dealer are required to register as Nursery Agents and pay a $1.00 fee annually.

Carabidae, Chrysomelidae, Elateridae, Melandryidae, and Staphylinidae; and Diptera - Bombyliidae and Syrphidae.

With the arrival in June of the new computer for collection management, the switchover from filecard records to computerized specimen records began. Computerization of the collection will permit more rapid retrieval of specimen data, as well as opening up the potential of retrieving data by criteria other than species name, such as by county or host. Several thousand specimen records were entered by the end of the year, mostly by summer PIL employee Keith Asbury. Full-time data entry would permit the computerization of the entire collection in less than a year. However, at the end of the summer, data entry will be reduced to part-time with the loss of the summer employees.

Horned Oak Gall on Pin Oak

The last of the planned field work on this project was completed in October, 1985. Weekly collections of 2-year-old galls were dissected and observations recorded by the PIL biologist. Information collected from this season-long effort provided us with a relatively clear picture of insect development in the second year of gall formation. Observations from the early part of the season showed that injection (Mauget, for example) type control treatments must be timed before the end of April if they are to have a chance of success.

Compilation and analysis of data and information accumulated on this project was not completed due to the demands of higher priority activities.

Modern Log Home Insect and Decay Problems

Contacts concerning modern log home insect and decay problems declined over recent years. One new complaint was received in February 1986 and the home was subsequently examined and recommendations made on April 23. At least 6 calls related to previous complaints were recorded.

Other principle activities of the PIL entomologist on this project included: (1) serving as a reviewer for Dr. William H. Robinson on a draft paper on old house borer in log homes for Pest Control Technology magazine; (2) writing to C. B. Knox in Daleville, Virginia about his records on log home fumigations in West Virginia; (3) contacting Andy Szakaly, a lawyer in Indiana, about lawsuits involving Traditional Living, Inc./Real Log Homes that he might be aware of; and (4) giving a 3 and 1/2 hour deposition to attorneys Charles Bagley III and Donald Kingery and court reporter Evalyn Bibbee concerning a Real Log Home involved in litigation over an old house borer problem.